

**FEDERAL EMERGENCY MANAGEMENT AGENCY  
MITIGATION DIRECTORATE  
TECHNICAL SERVICES DIVISION**

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**REVISIONS TO  
NATIONAL FLOOD INSURANCE PROGRAM MAPS**

**Application/Certification Forms and Instructions**

**For**

**Conditional Letters of Map Revision,**

**Letters of Map Revision, and**

**Physical Map Revisions**



### **Commonly Used Acronyms**

FEMA	Federal Emergency Management Agency.
NFIP	National Flood Insurance Program.
BFE	Base Flood Elevation. It is the height of the base flood, usually in feet, in relation to the datum used, or the depth of the base flood usually in feet, above the ground surface. The base flood is the flood that has a 1-percent probability of being equaled or exceeded in any given year (also referred to as the 100-year flood or the 1% annual chance flood).
FIS	Flood Insurance Study. An engineering study performed under contract to FEMA to identify flood-prone areas and to determine BFEs, flood insurance rate zones, and other flood risk data for a community.
FIRM	Flood Insurance Rate Map. An official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.
FBFM	The Flood Boundary and Floodway Map. The floodplain management map issued by FEMA that depicts, on the basis of detailed analyses, the boundaries of the 100- and 500-year floodplain and the regulatory 100-year floodway.
SFHA	Special Flood Hazard Area. Areas inundated by a flood having a 1-percent probability of being equaled or exceeded in any given year (also referred to as the 100-year flood).
FHBM	The Flood Hazard Boundary Map. The initial flood insurance map issued by FEMA that identified on the basis of approximate analyses, the areas of 100-year flood hazard in a community.
CHHA	Coastal High Hazard Area. An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

# INSTRUCTIONS FOR COMPLETING THE APPLICATION/CERTIFICATION FORMS FOR CONDITIONAL LETTERS OF MAP REVISION, LETTERS OF MAP REVISION, AND PHYSICAL MAP REVISIONS

## GENERAL

In 1968, the U.S. Congress passed the National Flood Insurance Act, which created the National Flood Insurance Program (NFIP). The NFIP was designed to reduce future flood losses through local floodplain management and to provide protection for property owners against potential losses through flood insurance.

As part of the agreement for making flood insurance available in a community, the NFIP requires the participating community to adopt floodplain management ordinances containing certain minimum requirements intended to reduce future flood losses. The community is also responsible for submitting data to the Federal Emergency Management Agency (FEMA) reflecting revised flood hazard information so that NFIP maps can be revised as appropriate. This will allow risk premium rates and floodplain management requirements to be based on current data.

Submissions to FEMA for revisions to effective Flood Insurance Studies (FISs) by individual and community requesters will require the signing of application/certification forms. These forms will provide FEMA with assurance that all pertinent data relating to the revision is included in the submittal. They will also assure that: (a) the data and methodology are based on current conditions; (b) qualified professionals have assembled data and performed all necessary computations; and (c) all individuals and organizations impacted by proposed changes are aware of the changes and will have an opportunity to comment on them. The circumstances for which this package is applicable are as follows:

Conditional Letter of Map  
Revision (CLOMR)

A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision (LOMR or Physical Map Revision (PMR)), or proposed hydrology changes (see 44 Code of Federal Regulations (CFR) Ch. 1, Parts 60, 65, and 72).

Letter of Map Revision  
(LOMR)

A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations (see 44 CFR Ch. 1, Parts 60, 65, and 72).

Physical Map Revision  
(PMR)

A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects large scope changes (see 44 CFR Ch. 1, Parts 60, 65, and 72).

It should be noted that FEMA may decide to defer a revision until a future date. Please note that for the following circumstances, this package is not applicable. Instead, the package entitled Amendments and Revisions to National Flood Insurance Program Maps, Application/Certification Forms and Instructions for Conditional Letters of Map Amendment, Letters of Map Amendment, Conditional Letters of Map Revision (Based on Fill), and Letters of Map Revision (Based on Fill) is appropriate.

Letter of Map Amendment  
(LOMA)

A letter from FEMA removing an existing structure or a legally defined parcel of land unaltered by fill from an SFHA (see 44 CFR Ch. 1, Part 70).

Conditional Letter of  
Map Amendment (CLOMA)

A letter from FEMA conditionally removing a proposed structure or a legally defined parcel of land unaltered by fill from an SFHA (see 44 CFR Ch. 1, Parts 70 and 72).

Letter of Map Revision  
Based on Fill (LOMR-F)

A letter from FEMA removing an existing structure or a or a legally defined parcel of land elevated by the placement of fill from an SFHA (see 44 CFR Ch. 1, Section 65.5 and Part 72).

Conditional Letter of Map  
Revision Based on Fill  
(CLOMR-F)

A letter from FEMA conditionally removing a proposed structure or a legally defined parcel of land to be elevated by the placement of fill from an SFHA (see 44 CFR Ch. 1, Section 65.5 and Part 72).

NFIP regulation, CFR Ch. 1, specifies the requirements regarding the submittal of revision requests to FEMA. A document entitled Appeals, Revisions, and Amendments to Flood Insurance Maps, A Guide for Community Officials, (FIA-12), provides background on the NFIP and an expanded explanation of these requirements.

NFIP Regulation, 44 CFR Ch. 1, Part 59, contain general provisions of the NFIP with which all requesters and community officials involved in revision requests should be familiar.

NFIP Regulation, 44 CFR Ch. 1, Section 65.2, contain definitions relative to certification of data, analyses, and structural works. This information is important to all professionals certifying technical information submitted with revision requests and should be carefully reviewed prior to signing the application/certification forms.

Part 72 of the NFIP regulations, published at 44 CFR 72, presents information regarding the reimbursement procedure that FEMA has initiated to allow for the recovery of costs associated with the review of requests for Conditional LOMRs, LOMRs, or Physical Map Revisions. The fees for FEMA's review and processing of CLOMRs, LOMRs, and Physical Map Revisions requests are as follows:

	CLOMR	LOMR	PMR
· Detailed data	--	\$2,300	\$2,300
· Channel modification, new bridge or culvert, or combination	\$3,100	\$3,700	\$3,700
· Levees, berms, or other structural modifications	\$3,300	\$4,300	\$4,300
· Structural measures on alluvial fan	\$5,000	\$5,000	\$5,000
· Review of revised hydrology	\$3,100	--	--
· "As-Built" request follow-up to CLOMR	--	\$2,300	\$2,300

For requests involving a combination of the above, the highest fee will apply.

Payment must be made in the form of a check or money order made payable to the National Flood Insurance Program. Please forward payment to the following address:

Federal Emergency Management Agency  
Revisions Fee-Collection System Administrator  
P.O. Box 3173  
Merrifield, Virginia 22116  
Fax: (703) 849-0282

Exempt from these reimbursement procedures for either proposed or "as-built" conditions are requests for: (1) map change requests based on federally sponsored flood-control projects where 50 percent or more of the project's costs are federally funded; (2) map change requests based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximated studies conducted by FEMA and shown on the effective FIRM; and (3) requests to correct NFIP map errors. Please note, the fee amounts and structure are reviewed by FEMA on a yearly basis. Based on this review the fee amounts and structure may be modified. To obtain current fee amounts contact the appropriate regional office indicated at the end of the instructions.

A request for a revision to the effective FIS information (FIRM, FBFM, and/or FIS report) is usually a request that FEMA replace the effective floodplain boundaries, flood profiles, floodway boundaries, etc., with those determined by the requester. Before FEMA will replace the effective FIS information with the revised, the requester must: (a) provide all of the data used in determining the revised floodplain boundaries, flood profiles, floodway boundaries, etc.; (b) provide all data necessary to demonstrate that the physical modifications to the floodplain have been adequately designed to withstand the impacts of the 1% annual chance flood event and will be adequately maintained; (c) demonstrate that the revised information (e.g., hydrologic and hydraulic analyses and the resulting floodplain and floodway boundaries) are consistent with the effective FIS information.

Completed application/certification forms should be neatly packaged in order, with the appropriate enclosure following each form submitted. A notebook-style format is ideal. The complete package should be submitted to the appropriate FEMA Regional Office. The addresses and telephone numbers of the ten Regional Offices, as well as information regarding which areas they support, are provided at the end of the instructions. The address and telephone number of the Headquarters office in Washington, D.C., are also provided.

If the request is a follow-up to a CLOMR for a project built as proposed, only the Revision Requester and Community Official Form and the Professional Certification Form need to be completed.

Additional information is contained on the forms. Wherever necessary, attach additional sheets required to provide the information requested on the forms.

**INSTRUCTIONS FOR COMPLETING THE  
REVISION REQUESTER AND COMMUNITY OFFICIAL FORM  
(FORM 1)**

This form provides the basic information regarding revision requests and must be submitted with each request. It contains much of the material needed for FEMA to assess the nature and complexity of the proposed revision. It will identify: (a) the type of response expected from FEMA; (b) those elements that will require supporting data and analyses; and (c) items needing concurrence of others. This form will also assure that the community is aware of the impacts of the request and has notified impacted property owners, if required. All items must be completed accurately. If the revision request is being submitted by an individual, firm, or other non-community official, contact should be made with appropriate community officials. NFIP regulation 44 CFR Ch. 1, Section 65.4, requires that revisions based on new technical data be submitted by the Chief Executive Officer (CEO) of the community or a designated official. Should the CEO refuse to submit such a request on behalf of another party, FEMA will agree to review it only if written evidence is provided indicating the CEO or designee has been requested to do so.

**Requested Response from FEMA**

1. Indicate the type of response being requested. Brief descriptions of possible responses are provided in the introduction; more detail regarding these responses and the data required to obtain each response are provided in the NFIP regulations, 44 CFR Ch. 1, and in the document entitled Appeals, Revisions and Amendments to Flood Insurance Maps: A Guide for Community Officials, (FIA 12).

**Overview**

1. Physical changes include watershed development, flood control structures, etc. Note that fees will be assessed for FEMA's review of proposed and "as-built" projects, as outlined in NFIP regulations 44 CFR Ch. 1, Part 72. Improved methodology may be a different technique (model) or adjustments to models used in the effective FIS. Improved data include revised as well as new data. Floodway revisions involve any shift in the FEMA-designated floodway boundaries, regardless of whether the shift is mappable.
2. Flooding source refers to a specific lake, stream, ocean, etc. This should match the flooding source name shown on the FIRM, if it has been labeled. (Examples: Lake Michigan, Duck Pond, or Big Hollow Creek).
3. Project Name/Identifier can be the name of a flood control project or other pertinent structure having an impact on the effective FIS, the name of a subdivision or area, or some other identifying phrase.
4. The Zone designation(s) affected can be obtained from the FIRM.
5. The map number, panel number, community number, and effective date can be obtained from the FIRM title block. The sample FIRM panels (Figures 1 and 2) provide a convenient source of information to fill in item 5.
6. Indicate the type(s) of flooding and structure(s) associated with the revision request.

**Encroachment Information**

1. If the revision request involves changes to a designated floodway and the floodway is regulated by a State agency, approval by the appropriate State agency must be obtained.

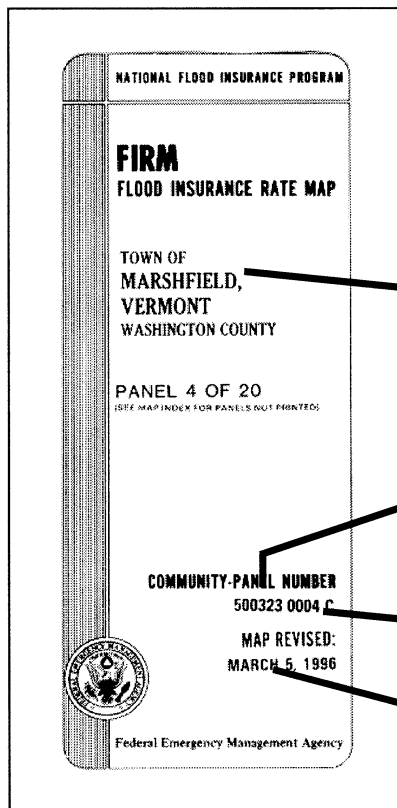


Figure 1. Sample FIRM Panel (Single Community)

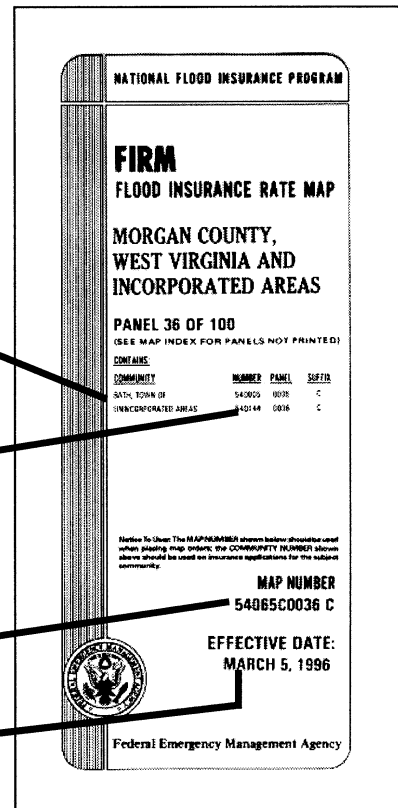


Figure 2. Sample FIRM Panel (Countywide)

2. This question applies to projects built in the floodway only. Indicate if the project built in the floodway causes any increase in the 1% annual chance flood elevation. If the project causes increases, all requirements of Section 65.12 of the NFIP regulations must be met.
3. This question applies to projects built in the floodway fringe, or the floodplain for streams where a floodway has not been established. If the project causes increases in the 1% annual chance flood elevation greater than one foot (or any other more stringent requirement set by the community), all requirements of Section 65.12 of the NFIP regulations must be met.

### Maintenance Responsibility

For revisions involving flood a control structure, indicate if the community will be responsible for maintaining the structure. Attach a maintenance and operations plan.

### Review Fee

Enter the fee amount associated with the request as indicated in the fee schedule provided in the introduction. Or, indicate that the revision meets the requirements for a fee exemption.

## **Signature**

### *Signature and Title of Revision Requester*

The person signing this certification should own the property involved in the request or have legal authority to represent a group/firm/organization or other entity in legal actions pertaining to the NFIP.

### *Signature and Title of Community Officials*

The person signing this certification should be the CEO for the community involved in this revision request or an official legally designated by the CEO. If more than one community is affected by the change, the community official from the community that is most affected should sign the form and letters from the other affected communities should be enclosed. If the community or communities disagree with the proposed revision, a signed statement should be attached to the request explaining the reasons or bases for disagreement. The community should refer to the document entitled Appeals, Revisions, and Amendments to Flood Insurance Maps: A Guide for Community Officials, (FIA-12).

### *Certification by Registered Professional Engineer and/or Land Surveyor*

The licensed professional engineer and/or land surveyor should have a current license in the State in which one of the impacted communities resides. While the individual signing this form is not required to have obtained the supporting data or performed the analyses, he or she must have supervised and reviewed the work.

A certification by a registered professional engineer or other party does not constitute a warranty or guarantee of performance, expressed or implied. Certification of data is a statement that the data is accurate to the best of the certifier's knowledge. Certification of analyses is a statement that the analyses have been performed correctly and in accordance with sound engineering practices. Certification of structural works is a statement that the works are designed in accordance with sound engineering practices to provide protection from the 1% annual chance flood. Certification of "as-built" conditions is a statement that the structure(s) has been built according to the plans being certified, is in place, and is fully functioning.

If the requester is a Federal agency who is responsible for the design and construction of flood control facilities, a letter stating that "the analyses submitted has been performed correctly and in accordance with sound engineering practices" may be submitted in lieu of this form. Regarding the certification of completion of flood control facilities, a letter from the Federal agency certifying its completion and the flood frequency event to which the project protects may be submitted in lieu of this form.

**INSTRUCTIONS FOR COMPLETING THE CREDIT CARD INFORMATION FORM  
(FORM 2)**

If the revision request involves a fee, the option of paying with a credit card is available. Accepted credit cards include Visa, and Mastercard. Please include the case number if known and clearly print all information.

## **INSTRUCTIONS FOR COMPLETING THE HYDROLOGIC ANALYSIS FORM (FORM 3)**

This form is to be completed when discharges other than those used in the FIS are proposed. Information requested is used to compare revised data to FIS data, compare revised discharges to FIS discharges, and to determine the merit of using revised methods and data over those used in the FIS. This form must be filled out for each flooding source studied.

### **Reason for New Hydrologic Analysis**

For revisions based on alternative methodologies or improved data, an explanation as to why the alternative methodology or improved data provides better results over the FIS must be presented and supported throughout the form. Models submitted in support of a revision request must meet the requirements of Subparagraph 65.6(a)(6) of the NFIP regulations.

### **Methodology for New Analysis**

Specify the method used for the new analysis. For each method specified, fill out the supporting attachment in form 3. Attach any additional backup computations and supporting data such as a soils map, soil group names, time of concentration computations, curve numbers, etc.

### **Approval of Analysis**

If approval of the new hydrologic analysis is required by a local, state, or Federal Agency, indicate if the analysis, including the resulting peak discharge value(s), has been approved by the appropriate local, state, or Federal Agency and attach evidence of the approval.

### **Comparison of Base Flood Discharges**

This section is to compare the effective discharges to the revised discharges. Attach a separate sheet comparing the base flood discharges for each flooding source.

In accordance with NFIP regulations, if only a portion of a detailed study stream is revised, transition to the unrevised portion must be assured to maintain the continuity of the study. Attach an explanation of how the transition from the proposed discharge to the effective discharge was made.

### **Historical Flooding Information**

This data can include high water marks for previous flooding events.

### **Attachment A: Statistical Analysis of Gage Records**

Statistical analyses of gage data are based on the guidelines set out in Bulletin 17B by the Interagency Advisory Committee on Water Data.

Systematic data refer to peak discharge data observed and recorded regularly over a period of time by a government agency or private firm. Historical data refers to peak discharge data observed outside the systematic period and recording only isolated outstanding events. Historical data should be documented whenever possible.

For data to be homogeneous, the long-term trend of the data should remain constant. In other words, the probability distribution used to describe it is independent of time. An example of non-homogeneous data would be peak discharge data at the confluence of two streams following two different flow regimes.

Adjustments made to the statistical data/record, such as the use of a second gauging station to compensate for a short record or adjustments for zero flood years.

Bulletin 17B recommends the use of the log-Pearson Type III (LP3) distribution for the statistical analysis of flood data. However, there may be situations where the LP3 distribution is inappropriate and another probability distribution must be used. Other distributions include Extreme Value (Gumbel) and log-normal (Galton). The use of alternative distributions must be justified and fully documented.

Comparison with other analyses includes comparing the analysis with another station on a hydrologically similar stream or using an alternative analysis (e.g., regression equations) to verify the reasonableness and logic of the results.

#### **Attachment B: Confidence Limits Evaluation**

When revised discharges are not significantly different than the FIS discharges, FEMA may require a confidence limit analysis at a later date to complete the review.

#### **Attachment C: Regression Analysis (one per stream)**

The source of the regression equations must be given along with a proper bibliographical reference. The U.S. Geological Survey (USGS), in cooperation with State agencies in charge of monitoring water data, has developed regression equations on a state-by-state basis. As these are revised regularly, FEMA will accept only the most recently published regression equation report. Other agencies also put out regression analyses reports, or a regional analyses can be performed.

Stream stations are grouped in hydrologic regions in which certain basin parameters have been found to have roughly the same influence on the peak flows as evidenced by the multiple regression analysis. It can happen that a stream watershed may encompass more than one region, in which case some proportionality of the influence of each region upon the peak discharge must be considered.

Most regression equations are developed for rural or undeveloped conditions. These results can be modified to reflect urban or developed conditions. If urbanized conditions were considered, the methodology for developing the urban discharges must be described and/or referenced and the percentage of the watershed that is urbanized must be given.

Because regression equations are based on compilation of data from several gage stations, a certain amount of natural basin storage is inherent in the equations. However, regression equations are not designed to handle watersheds controlled by major storage features such as flood control structures. If such structures exist, a full account of how flood storage was considered must be given.

#### **Attachment D: Precipitation/Runoff Model (One Per Model)**

Baseflow is defined as the estimated flow occurring in the stream before the flood event occurs.

Because there are many different precipitation/runoff models, many with a different theoretical basis, it is very difficult, if not impossible, to prove that one model provides superior results over another. Therefore, it must be shown that the types of parameters, the theoretical basis, and source of data provide superior results.

If possible, a precipitation runoff model should be compared and calibrated to a known flood event in order to justify the values of the parameters and the assumptions made in the model. All calibration and verification runs should be described and the results discussed. Please attach hard copies of the calibration and verification model outputs.

## INSTRUCTIONS FOR COMPLETING THE RIVERINE HYDRAULIC ANALYSIS FORM (FORM 4)

This form is to be completed when the request involves a hydraulic analysis for riverine flooding that differs from that used to develop the FIRM.

### **Reach to be Revised**

The reach to be revised, or the area of revision, is defined by an effective tie-in at the upstream and downstream limits. For streams which have a detailed study, an effective tie-in is obtained by tying in to the natural and floodway water-surface elevation within 0.10 feet, and to the effective encroachment stations and floodway topwidths at both the upstream and downstream limits. For streams that do not have a detailed study, a tie-in is obtained by tying in to the natural water-surface elevation of the pre-project conditions model at both the upstream and downstream limits. Please note that the area of revision and the project area are not necessarily the same. In fact they are almost always different.

### **Models Submitted**

#### *Duplicate effective model*

The effective multiple discharge (10-, 50-, 100-, and 500-year) and the floodway (100-year natural and encroached runs) models are required to be submitted to establish base-line models.

To obtain copies of the effective FIS models, either the community or FEMA Regional offices should be contacted for direction. A list of FEMA Regional offices is located at the end of the instructions. If the effective models are not available, the requester must generate models that duplicate the FIS profiles and the elevations shown in the Floodway Data Table in the FIS report to within 0.1 foot or contact FEMA Headquarters for guidance. FEMA Headquarters should be contacted if this model cannot be produced. If an alternative hydraulic model is used, it must be shown that the use of the original model is inappropriate and the new model must be calibrated to reproduce the FIS profiles within 0.1 foot.

#### *Corrected effective model*

The corrected effective model may be submitted to provide a more detailed analysis than the duplicate effective model at the project site or fix any technical deficiencies.

#### *Existing or pre-project conditions model*

The existing or pre-project model may be required to support conclusions about the actual impacts of the project associated with the revised or post-project model or to establish more up-to-date models on which to base the revised or post-project conditions model.

#### *Revised or post-project conditions model*

The revised or post-project conditions model is required to be submitted. This model must always include the existing and post-project conditions.

Additional information about these models is contained on the form.

When the request is for a proposed project, the revised or post-project model should reflect proposed conditions. The information requested on the Hydraulic Analysis Form is intended to document the steps taken by the requester in the process of preparing the revised or post-project conditions hydraulic model and the resulting revised FIS information. The following guidelines should be followed when completing the form:

- (a) All changes to the duplicate and subsequent models must be supported by certified topographic information, bridge plans, construction plans, survey notes, etc.

- (b) Changes to the hydraulic models should be limited to the stream reach for which the revision is being requested. Cross sections upstream and downstream of the revised reach should be identical to those in the effective model. If this is done, water surface elevations and topwidths computed by the revised models should match those in the effective models upstream and downstream of the revised reach as required.
- (c) There must be consistency between the revised hydraulic models, the revised floodplain and floodway delineation's, the revised flood profiles, topographic work map, annotated FIRMs and/or FBFMs, construction plans, bridge plans, etc.

For SFHAs designated as Zone A, the existing or pre-project model and the revised or post-project model, or other hydraulic analyses for existing and revised conditions are required to determine the 100-year flood profile. The existing model or analysis is required to support conclusions about the actual impacts of the project associated with the revised or post-project model or analysis.

### **Starting Water-Surface Elevations**

For a detailed studied stream, the effective known water-surface elevation should be used as a starting condition. The slope-area method is recommended for streams that do not have a detailed study.

### **Results (from the model used to revise the 100-year water surface elevation)**

Check all selections that apply and attach an explanation for each.

FEMA developed the CHECK-2 computer program to facilitate the review of hydraulic analyses done using the U.S. Army Corps of Engineers (USACE) HEC-2 program. A copy of CHECK-2 can be obtained by contacting FEMA Headquarters at the address listed at the end of the instructions.

### **Revised FIRM/FBFM and Flood Profiles**

1. Indicate the tie-in locations to the effective study. See above discussion for obtaining an effective tie-in.
2. Attach profiles, at the same vertical and horizontal scales as the profiles in the effective FIS report, showing stream bed and profiles of all floods studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, and study limits. If channel distance has changed, the stationing should be revised for all profile sheets.
3. Attach a Floodway Data Table showing data for each cross section listed in the published Floodway Data Table in the FIS report.

## **INSTRUCTIONS FOR COMPLETING THE RIVERINE/COASTAL MAPPING FORM (FORM 5)**

This form is to be completed when mapping changes to either the FIRM or FBFM are proposed and to assure that the revised floodplain and floodway boundary information tie-in to the effective information so that a consistent NFIP map is maintained. In addition, the questions asked and information required are to determine the impacts of the revision, including increases in SFHA and shifts in floodway both on and off the requester's property.

### **Mapping Changes**

1. A certified topographic workmap of suitable scale, contour interval, and planimetric definition must be submitted showing all the items that apply. For those items marked NO or N/A, attach an explanation as to why they were not included or why they do not apply.
2. Indicate the source and date of the updated topographic information.
3. Indicate the scale and contour interval of the effective FIS workmap and the submitted topographic workmap. The effective workmap contour interval and scale can be obtained from the FIS text. Note that the revised topographic information must be of equal or greater detail than that the effective.
4. Attach an annotated FIRM panel showing the revised 1% and 0.2% annual chance floodplains and floodway boundaries. The revised boundaries must tie into the effective boundaries.

### **Earth Fill Placement**

When fill is placed in the 1% annual chance floodplain and the request is to alter 100-year flood boundary, in order to permanently remove the filled area from the floodplain, the fill must be compacted and protected against erosion from moving flood waters.

An insurable structure is defined as a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a manufactured home on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration or repair, but does not include building materials or supplies intended for use in such construction, alteration or repair, unless such materials or supplies are within an enclosed building on the premises.

If structures can conceivably be constructed on the fill at any time in the future, certification of fill compaction must be submitted in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

## **INSTRUCTIONS FOR COMPLETING THE CHANNELIZATION FORM (FORM 6)**

This form is to be completed when any portion of the stream channel is altered or relocated. When the Channelization Form is submitted, a Riverine Hydraulic Analysis Form must also be submitted.

The purpose of the Channelization Form is to assure that the channel will function properly as designed and pass the 1% annual chance flood as determined by the hydraulic analysis. Typically, channelization increases the channel velocity above the natural channel velocity. Documentation must be provided that assures that the channel lining will withstand the velocities associated with the 1% annual chance flood. Additional considerations are the stability of the flow regime and the affects of sediment transport.

### **Reach to be Revised**

Indicate the extent of the channelization.

### **Channel Description**

Attach a description of the channel inlet and outlet, cross sectional and planimetric configuration, and the channel bottom and side linings.

### **Accessory Structures**

Indicate all the accessories included with the channelization.

### **Drawing Checklist**

Attach engineering drawings of the channelization certified by a registered professional engineer.

### **Hydraulic Considerations**

Attach any explanations necessary.

### **Sediment Transport Considerations**

Provide any necessary information if there is evidence that sediment transport will affect the 1% annual chance water-surface elevations.

**INSTRUCTIONS FOR COMPLETING THE BRIDGE/CULVERT FORM  
(FORM 7)**

This form is to be completed when the request involves a new bridge or culvert or a new or revised analysis of an existing bridge or culvert.

**Identifier**

Typically, a revision is not requested to reflect a new analysis of a previously studied existing structure. If this is the case, an explanation of why the new analysis was performed is required. Typically, the structure is analyzed using the same method of analysis used for the flooding source. If a different method is used for the structure, justification why the hydraulic analysis utilized for the flooding source could not analyze the structure must be enclosed.

**Drawing Checklist**

Attach plans of the structure certified by a registered professional engineer.

**Sediment Transport Considerations**

Provide any necessary information if there is evidence that sediment transport will affect the 1% annual chance water-surface elevations.

## **INSTRUCTIONS FOR COMPLETING THE LEVEE/FLOODWALL SYSTEM ANALYSES FORM (FORM 8)**

The purpose of this form is to assure that the levee or floodwall is designed and/or constructed to provide protection from the 1% annual chance flood, in full compliance with 44 CFR Ch. 1, Section 65.10 of the NFIP regulations, before reflecting its effects on an NFIP map. A complete engineering analysis must be submitted in support of each section of this form. In addition, a vicinity map along with a complete set of flood profile sheets, plan sheets, and layout detail sheets must be submitted. These sheets must be numbered, and an index must be provided that clearly identifies those sheets specifically relating to the levee or floodwall in question.

### **Reach to be Revised**

Indicate the extent of the levee/floodwall system.

### **Levee/Floodwall System Elements**

Indicate all the levee/floodwall system elements that apply and provide engineering drawings certified by a registered professional engineer.

### **Freeboard**

Riverine levees must provide a minimum freeboard of three feet above the 1% annual chance water-surface elevation. An additional one foot above the minimum is required within 100 feet in either side of structures (such as bridges) riverward of the levee or wherever the flow is constricted. An additional one-half foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, is also required. If exceptions to the minimum freeboard requirements are requested, attach documentation addressing Subparagraph 65.10(b)(ii) of the NFIP regulations.

### **Sediment Transport Consideration**

Provide any necessary information if there is evidence that sediment transport will affect the 1% annual chance water-surface elevations.

### **Closures**

All openings must be provided with closure devices that are structural parts of the system during operation and design.

### **Embankment Protection**

The embankment protection analysis must demonstrate that no appreciable erosion of the levee embankment can be expected during the 1% annual chance flood, as a result of either current or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability. Factors to be addressed include, but are not limited to: expected flow velocities; expected wind and wave action; ice loading; impact of debris; slope protection techniques; duration of flooding at various stages and velocities; embankment and foundation materials; levee alignment; bends; transitions; and levee side slopes.

Attach engineering analysis to support the construction plans. Submit all backup information used in the analysis.

### **Embankment and Foundation Stability**

This analysis must evaluate expected seepage during loading conditions associated with the 1% annual chance flood and shall demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment and foundation stability. An alternative analysis described in the USACE manual, “Design and Construction of Levees” (EM 1110-2-1913, Chapter 6, Section II), may be used. The factors that must be addressed in the analysis include: depth of flooding, duration of flooding, embankment geometry and length of seepage path at critical locations, others design factors (such as drainage layers), and others design factors affecting embankment and foundation stability (such as berms). Submit all backup information used in the analysis.

### **Floodwall and Foundation Stability**

See above embankment and foundation stability discussion.

### **Settlement**

The settlement analysis must assess the potential and magnitude of future losses of freeboard and must demonstrate that the minimum freeboard requirements will be maintained. The analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in the USACE manual, “Soil Mechanics Design-Settlement Analysis” (EM 1100-2-1904) must be submitted. Submit all backup information used in the analysis.

### **Interior Drainage**

In accordance with Subparagraph 65.10(b)(6) of the NFIP regulations, the interior drainage analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities for evacuating interior floodwaters. The analysis must identify the extent of the flooded area, and the water-surface elevation(s) of the 1% annual chance flood if the average depth is greater than one foot. This information is to show on a certified topographic workmap. All back-up information must be submitted.

### **Other Design Criteria**

Address any other criteria that may be a problem and attach any supporting documentation.

### **Operational Plan and Criteria**

For a levee system to be recognized by FEMA, the operational criteria must be as described in Subparagraph 65.10(c) of the NFIP regulations.

## **INSTRUCTIONS FOR COMPLETING THE COASTAL ANALYSIS FORM (FORM 9)**

The information requested on the Coastal Analysis Form is intended to document the steps taken by the requester in the process of preparing the revised models or analyses and the resulting revised FIS information. Refer to the Guidelines and Specifications for Wave Height Determination and V Zone Mapping for the wave height analyses and mapping procedures used by FEMA for coastal areas. The following guidelines should be followed when completing the form:

### **Coastline to be Revised**

Describe the limits of the restudied area. Road names and/or landmarks in the vicinity of the restudied area or transects used in the effective FIS may be used as reference points.

### **Effective FIS**

The type of analyses (approximate or detailed wave parameter computations) used for the effective FIS for the community being restudied must be provided. This information is available in the hydrologic and hydraulic sections of FIS text.

### **Revised Analysis**

All changes to effective models must be supported by certified topographic information, structure plans, survey notes, storm surge data, meteorological data, etc. All equations or models used must be referenced. Descriptions and/or sketches of transect profiles should be attached for revised erosion, wave height, wave runup, and wave overtopping analyses. Wave runup and wave overtopping should be considered when the wave heights near the crest of the shore protection structure or natural land forms. If FEMA procedures are not used in the revised analyses, explanations for replacing FEMA's procedures with the revised methodology should be provided.

### **Results**

Information must be provided to determine the impact of the analysis on the mapping of the coastal high hazard areas, including the location of the coastal high hazard area boundaries, maximum wave height elevation, and the maximum wave runup elevation. Mapping resulting from the re-analysis of the effective study must tie-in with areas not re-studied. The mapped inland limit of the coastal high hazard areas (V-zones) as a result of the re-analysis must be in compliance with 44 CFR Ch. 1 Section 65.11 of the NFIP regulations in areas where primary frontal dunes are present.

## **INSTRUCTIONS FOR COMPLETING THE COASTAL STRUCTURES FORM (FORM 10)**

The Coastal Structures Form is to be completed when a revision to coastal flood hazard elevations and/or areas is requested based on coastal structures being credited as providing protection from the base flood. The purpose of the Coastal Structures Form is to assure that the structure is designed and constructed to provide protection from the base flood without failing or causing an increase in flood hazards to adjacent areas. Refer to the Guidelines and Specifications for Wave Height Determination and V Zone Mapping for the criteria for evaluating flood protection structures.

If the coastal structure is a levee/floodwall, complete the Levee/Floodwall System Analysis Form in lieu of this form. When the Coastal Structures Form is submitted, the Coastal Analysis Form should also be submitted.

### **Background**

The type of structure, the location, the material being used, and the age of the structure must be provided. Certified “as built” plans must also be provided. If these plans are not available, an explanation must be given with sketches of the general structure dimensions as described. If the structure design has been certified by a Federal agency to provide flood protection and withstand forces from the 100 year (base) flood, the dates of the project completion and certification of the structure should be provided, and the remainder of the form does not need to be completed.

### **Design Criteria**

Documentation must be provided that assures a coastal structure is designed and constructed to withstand the wind and wave forces associated with the base flood. The minimum freeboard of the structure must be in compliance with 44 CFR Ch.1, Section 65.10. Additional concerns include the impact to areas directly landward of the structure that may be subjected to overtopping and erosion along with possible failure of the structure due to undermining from the backside and the possible increase in erosion at the ends of the structure to unprotected properties. The evaluation of protection provided by sand dunes must follow the criteria outlined in 44 CFR Ch. 1, Section 65.11.

## **INSTRUCTIONS FOR COMPLETING THE DAM FORM (FORM 11)**

The Dam Form is to be filled out when there is an existing, proposed, or modified dam along a stream studied in detail. Any flood control storage to be considered in the hydrologic analysis for the dam should be totally dedicated to flood control. If the dam is not certified to safely pass the 1% annual chance flood and the dam has a reasonable probability of failure during the 1% annual chance flood, a dam break analysis should be submitted. The dam break analysis should provide consistent results, use empirical peak discharges from actual dam failures, require minimal input data, and perform river routing of the failure hydrograph by dynamic procedures, which includes attenuation and translation. The NFIP does not involve appraisal of dam safety adequacy; however, the FISs should include impacts of structures when subjected to 1% annual chance flood hydrographs. Local, State, and/or Federal laws address dam safety features.

**INSTRUCTIONS FOR COMPLETING THE ALLUVIAL FAN FLOODING FORM  
(FORM 12)**

The purpose of this form is to assure that a structural flood control measure in areas subject to alluvial fan flooding is designed and/or constructed to provide protection from the 1% annual chance flood, in compliance with 44 CFR Ch. 1, Section 65.13 of the NFIP regulations, before it is recognized on an NFIP map. Please be aware that elevation of a parcel of land or a structure by fill or other means only, will not serve as a basis for removing areas subject to alluvial fan flooding from an area of special flood hazards. See Section 65.13 of the NFIP regulations. Complete engineering analyses must be submitted in support of each section of this form. In addition, it may be necessary to complete other forms relating to specific flood control measures, such as levees/floodwalls, channelization, or dams.

## FEMA REGIONAL OFFICES

### **REGION 1**

(Connecticut, Maine, Massachusetts,  
New Hampshire, Rhode Island, Vermont)

Federal Emergency Management Agency  
Mitigation Division  
J. W. McCormack Post Office and  
Courthouse Building, Room 462  
Boston, Massachusetts 02109-4595  
(617) 223-9561

### **REGION 2**

(New York, Puerto Rico, New Jersey)

Federal Emergency Management Agency  
Mitigation Division  
26 Federal Plaza, Room 1351  
New York, New York 10278-0002  
(212) 225-7200

### **REGION 3**

(Delaware, D.C., Maryland,  
Pennsylvania, Virginia, West Virginia)

Federal Emergency Management Agency  
Mitigation Division  
Liberty Square Building  
(Second Floor)  
105 South Seventh Street  
Philadelphia, Pennsylvania 19106-3316  
(215) 931-5512

### **REGION 4**

(Alabama, Florida, Georgia, Kentucky,  
Mississippi, N. Carolina, S. Carolina, Tenn.)

Federal Emergency Management Agency  
Mitigation Division  
Koger Center - Rutgers Building  
3003 Chamblee Tucker Road  
Atlanta, Georgia 30341  
(770) 220-5406

### **REGION 5**

(Illinois, Indiana, Michigan  
Minnesota, Ohio, Wisconsin)

Federal Emergency Management Agency  
Mitigation Division  
175 West Jackson Boulevard,  
Fourth Floor  
Chicago, Illinois 60604-2698  
(312) 408-5596

### **REGION 6**

(Arkansas, Louisiana, New Mexico, Oklahoma, Texas)

Federal Emergency Management Agency  
Mitigation Division  
Federal Regional Center  
800 North Loop 288  
Denton, Texas 76201-3698  
(817) 898-5165

### **REGION 7**

(Iowa, Kansas, Missouri, Nebraska)

Federal Emergency Management Agency  
Mitigation Division  
2323 Grand Boulevard, Suite 900  
Kansas City, Missouri 64108  
(816) 283-7002

### **REGION 8**

(Colorado, Montana, N. Dakota, S. Dakota, Utah,  
Wyoming)

Federal Emergency Management Agency  
Mitigation Division  
175 West Jackson Boulevard,  
Fourth Floor  
Chicago, Illinois 60604-2698  
408-5596

### **REGION 9**

(Arizona, California, Hawaii, Nevada)

Federal Emergency Management Agency  
Mitigation Division  
Presidio of San Francisco, Building 105  
San Francisco, California 94129-1250  
(415) 923-7175

### **REGION 10**

(Alaska, Idaho, Oregon, Washington)

Federal Emergency Management Agency  
Mitigation Division  
Federal Regional Center  
130 228th Street, S.W.  
Bothell, Washington, 98021-9796  
(206) 487-4600

## **FEMA HEADQUARTERS OFFICE**

Inquiries to FEMA Headquarters should be addressed  
to the following address:

Federal Emergency Management Agency  
Mitigation Directorate  
Hazard Identification and Risk Assessment Division  
500 C Street, SW  
Washington, DC 20472  
(202) 646-3680

FEDERAL EMERGENCY MANAGEMENT AGENCY  
REVISION REQUESTER AND COMMUNITY OFFICIAL

O.M.B No. 3067-0148  
Expires April 30, 2001

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

**1. REQUESTED RESPONSE FROM FEMA**

This request is for a:

- ☐ CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60,65 & 72).
- ☐ LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)
- ☐ Other Describe: \_\_\_\_\_

**2. OVERVIEW**

1. The basis for this revision request is (are): (check all that apply)

- ☐ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision
- ☐ Other Describe: \_\_\_\_\_

Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: \_\_\_\_\_

3. Project Name/Identifier: \_\_\_\_\_

4. FEMA zone designations affected: \_\_\_\_\_  
(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	Katy, City Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding	Structures
<input type="checkbox"/> Riverine	<input type="checkbox"/> Channelization
<input type="checkbox"/> Coastal	<input type="checkbox"/> Levee/Floodwall
<input type="checkbox"/> Alluvial fan	<input type="checkbox"/> Bridge/Culvert
<input type="checkbox"/> Shallow Flooding (e.g. Zones AO and AH)	<input type="checkbox"/> Dam
<input type="checkbox"/> Lakes	<input type="checkbox"/> Fill
<input type="checkbox"/> Other (describe)	<input type="checkbox"/> Other (describe)

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

#### 4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP? ☐ Yes ☐ No

If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No ☐ N/A
3. Does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the base flood elevation to increase at any location by more than one foot (or other increase limit if community or state has adopted more stringent criteria - even if a floodway has not been delineated by FEMA)? ☐ Yes ☐ No

If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

#### 5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☐ performing ☐ overseeing compliance with the maintenance and operation plans of the \_\_\_\_\_ flood  
(Name)  
control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Operation and maintenance plans are attached. ☐ Yes ☐ No ☐ N/A

#### 6. REVIEW FEE

The review fee for the appropriate request category has been included. ☐ Yes Fee amount: \$ \_\_\_\_\_  
OR

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt. ☐ Yes

Please see Instructions for Fee Amounts

#### 7. SIGNATURE

**Note:** I understand that my signature indicates that all information submitted in support of this request is correct

\_\_\_\_\_  
Signature of Revision Requester

\_\_\_\_\_  
Printed Name and Title of Revision Requester

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Telephone No. \_\_\_\_\_ Date

**Note:** Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

\_\_\_\_\_  
Signature of Community Official

\_\_\_\_\_  
Printed Name and Title of Community Official

\_\_\_\_\_  
Community Name

\_\_\_\_\_  
Telephone No. \_\_\_\_\_ Date

#### CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. 1, Sect 65.2

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name and Title of Revision Requester

Registr No. \_\_\_\_\_ Expires (Date) \_\_\_\_\_ State \_\_\_\_\_

Type of License/Expertise: \_\_\_\_\_

#### Check which forms have been included with this request

##### Form Name and (Number)

- |  |   |
|--|---|
| <input type="checkbox"/> Hydrologic (3)          | new or revised discharges               |
| <input type="checkbox"/> Hydraulic (4)           | new or revised water-surface elevations |
| <input type="checkbox"/> Mapping (5)             | floodplain/floodway changes             |
| <input type="checkbox"/> Channelization (6)      | channel is modified                     |
| <input type="checkbox"/> Bridge/Culvert (7)      | addition/revision of bridge/culvert     |
| <input type="checkbox"/> Levee/Floodwall (8)     | addition/revision of levee/floodwall    |
| <input type="checkbox"/> Coastal (9)             | new or revised coastal elevations       |
| <input type="checkbox"/> Coastal Structures (10) | addition/revision of coastal structure  |
| <input type="checkbox"/> Dam (11)                | addition/revision of dam                |
| <input type="checkbox"/> Alluvial Fan (12)       | structures proposed on alluvial fan     |

##### Required if .....

FEDERAL EMERGENCY MANAGEMENT AGENCY  
CREDIT CARD INFORMATION

O.M.B. Burden No. 3067-0148  
Expires April 30, 2001

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 6 minutes per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

If paying by credit card, this form must be completed. **THIS FORM SHOULD NOT BE INCLUDED WITH THE REST OF THE FORMS PACKAGE. IT MUST BE MAILED OR FAXED TO:**

Federal Emergency Management Agency  
Revisions Fee-Collection System Administrator  
P.O. Box 3173  
Merrifield, Virginia 22116  
Fax: (703) 849-0282

Case # \_\_\_\_\_ (if known)

Amount: \$ \_\_\_\_\_

☐ FEE

☐ ADDITIONAL FEE

☐ INVOICE

☐ VISA

☐ MASTERCARD

CARD NUMBER: \_\_\_\_\_

EXPIRATION DATE: \_\_\_\_\_

\_\_\_\_\_  
Signature

NAME (AS IT APPEARS ON CARD): \_\_\_\_\_  
(please print)

ADDRESS: \_\_\_\_\_  
(for your  
credit card  
receipt-  
please print)

DAYTIME PHONE: \_\_\_\_\_

**NOTICE: A COPY OF FORM 1, BEING SUBMITTED FOR THIS REQUEST MUST BE ATTACHED TO THIS FORM.**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
HYDROLOGIC ANALYSIS

O.M.B No. 3067-0148  
Expires April 30, 2001

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average **3.67** hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

**Note: Fill out one form for each flooding source studied**

Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. REASON FOR NEW HYDROLOGIC ANALYSIS**

- ☐ No existing analysis      ☐ Improved data      ☐ Changed physical condition of watershed  
☐ Alternative methodology      ☐ Proposed Conditions (CLOMR)      ☐ Other

**For the reason stated above, please attach a detailed explanation.** If a computer program/model was used in revising the hydrologic analysis, **please provide a diskette with the input files** for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

**Explanation provided:** ☐ Yes ☐ No      **Diskettes provided:** ☐ Yes ☐ No

**2. METHODOLOGY FOR NEW ANALYSIS**

<u>Indicate Method</u>	<u>Required Data</u>	<u>Data Included</u>	
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Other	Back-up computations and supporting data	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**3. APPROVAL OF ANALYSIS**

The hydrologic analysis has already been approved by a local, state, or Federal Agency. ☐ Yes ☐ No ☐ Not Required

If Yes, attach evidence of approval. ☐ **Approval attached.**      If No, attach explanation. ☐ **Explanation attached.**

**4. COMPARISON OF BASE FLOOD DISCHARGES**

Location	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

*Note: When revised discharges are not significantly different than the FIS discharges, FEMA may require a confidence limits analysis (see attachment B) at a later date to complete the review.*

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. ☐ **Explanation Included**      ☐ **Explanation Not Required**

**5. HISTORICAL FLOODING INFORMATION**

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. ☐ **Data Attached**      ☐ **Data Not Available**

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

# ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: \_\_\_\_\_

Gage Location (latitude and longitude): \_\_\_\_\_

FIS:

Revised:

- |  |  |  |
|--|--|--|
| 1. Number of years of data   | _____  | _____  |
| Systematic   | _____  | _____  |
| Historical   | _____  | _____  |
| 2. Homogeneous data  | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 3. Data adjustments  | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 4. Number of high outliers   | _____  | _____  |
| Low outliers   | _____  | _____  |
| Zero events  | _____  | _____  |
| 5. Generalized skew  | _____  | _____  |
| 6. Station skew  | _____  | _____  |
| 7. Adopted skew  | _____  | _____  |
| 8. Probability distribution used (justify if log-Pearson III was not used) | _____  | _____  |
| 9. Transfer equations to ungaged sites                                     |  | <input type="checkbox"/> Yes <input type="checkbox"/> No |

**If Yes, specify method**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- |   |  |
|---|--|
| 10. Expected probability*                     | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 11. Comparison of results with other analyses | <input type="checkbox"/> Yes <input type="checkbox"/> No |

**If Yes, describe comparison**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

12. **Attach analysis including plot of flood-frequency curve.** Analysis Attached? ☐ Yes ☐ No

\*FEMA does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

**If any data are not available, indicate by N/A.**

## ATTACHMENT B: CONFIDENCE LIMITS EVALUATION

Stream: \_\_\_\_\_

Select one location for Confidence Limits Evaluation (*describe location*): \_\_\_\_\_

1. Discharges for selected location:

Exceedence Probability

FIS:

Revised:

10%	(10-year)	_____ cfs	_____ cfs
2%	(50-year)	_____ cfs	_____ cfs
1%	(100-year)	_____ cfs	_____ cfs
0.2%	(500-year)	_____ cfs	_____ cfs

2. 1% Annual Chance (Base) Flood Confidence Intervals

90% Confidence Interval:

5% limit \_\_\_\_\_ cfs

95% limit \_\_\_\_\_ cfs

50% Confidence Interval:

25% limit \_\_\_\_\_ cfs

75% limit \_\_\_\_\_ cfs

3. If the discharge of the base flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the Base flood elevation change by 1.0 foot or more? ☐ Yes ☐ No

An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

4. **Confidence Limits Analysis Attached?** ☐ Yes ☐ No

# ATTACHMENT C: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference:

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*(Attach a copy of title page, table of contents, and pertinent pages including equations.)*

2. Gaged or ungaged stream: \_\_\_\_\_

3. Hydrologic region(s): \_\_\_\_\_  
**Attach backup map.**

4. Provide parameters, values, and source of data used to define parameters.

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FIS:

Revised:

- |                                      |                              |                             |                              |                             |
|--------------------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|
| 5. Urbanized conditions calculations | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 6. Percent of watershed urbanization | _____                        |                             | _____                        |                             |
| 7. Is the watershed controlled?      | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 8. Comparison with other analyses    | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

**If the answer to 5, 7, or 8 is Yes, explain methodology below. If data are not available, indicate with N/A.**

Comments

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9. Attach computation and supporting maps, delineating the watershed boundary and drainage area divides.

**Computation and Supporting Maps provided?** ☐ Yes ☐ No

# ATTACHMENT D: PRECIPITATION/RUNOFF MODEL

FIS:

Revised:

1. Method or model used:

Version:

Date:

2. Source of rainfall depth:

3. Source of rainfall distribution:

4. Rainfall duration:

5. Areal adjustment to precipitation (%):

6. Maximum overland flow length

7. Hydrograph development method:

8. Loss rate method:

Source of soils information:

Source of land use information:

9. Channel routing method:

10. Reservoir routing:

☐ Yes

☐ No

☐ Yes

☐ No

11. Baseflow considerations:

☐ Yes

☐ No

☐ Yes

☐ No

**If Yes, explain below how baseflow was determined:**

12. Snowmelt considerations:

☐ Yes

☐ No

☐ Yes

☐ No

13. Model calibration:

☐ Yes

☐ No

☐ Yes

☐ No

**If Yes, explain below how calibration was performed**

14. Future land use condition:

☐ Yes

☐ No

☐ Yes

☐ No

**If Yes, explain why below**

15. **Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.**

**Information and Maps provided?** ☐ Yes ☐ No

**NOTE:** FEMA policy is to base flooding on existing conditions

FEDERAL EMERGENCY MANAGEMENT AGENCY  
RIVERINE HYDRAULIC ANALYSIS

O.M.B No. 3067-0148  
Expires April 30, 2001

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

*Note: Fill out one form for each flooding source studied*

Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. REACH TO BE REVISED**

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.  
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☐ Yes

Downstream Limit: \_\_\_\_\_

Upstream Limit: \_\_\_\_\_

**2. MODELS SUBMITTED**

**Requirements: for areas which have detailed flooding:**

Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.

**for areas which do not have detailed flooding:**

Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

**If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.**

**1. Duplicate Effective Model** ☐ Natural File Name \_\_\_\_\_ ☐ Floodway File Name \_\_\_\_\_

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

**2. Corrected Effective Model** ☐ Natural File Name \_\_\_\_\_ ☐ Floodway File Name \_\_\_\_\_

The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

**3. Existing or Pre-Project Conditions Model** ☐ Natural File Name \_\_\_\_\_ ☐ Floodway File Name \_\_\_\_\_

The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

**4. Revised or Post-Project Conditions Model** ☐ Natural File Name \_\_\_\_\_ ☐ Floodway File Name \_\_\_\_\_

The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

**5. Other** - Please attach a sheet describing all other models submitted along with the file names. ☐ Natural ☐ Floodway

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

### 3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached? ☐ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended.  
For detailed analysis studies, using a known water-surface elevation is recommended.

### 4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

- ☐ Supercritical depth      ☐ Critical Depth      ☐ Drawdowns      ☐ Negative Floodway Surcharges
- ☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State
- ☐ Water surface elevations higher than the end points of cross sections.
- ☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.
- ☐ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☐ Explanation provided on attached printout ☐

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? ☐ Yes ☐ No  
(see instructions for information on how to obtain CHECK-2)

### 5. REVISED FIRM/FBFM AND FLOOD PROFILES

#### 1. Profile Transition

- a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End \_\_\_\_\_ within \_\_\_\_\_ (feet)  
Cross-Section #

Upstream End \_\_\_\_\_ within \_\_\_\_\_ (feet)  
Cross-Section #

- b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End \_\_\_\_\_ within \_\_\_\_\_ (feet)  
Cross-Section #

Upstream End \_\_\_\_\_ within \_\_\_\_\_ (feet)  
Cross-Section #

- c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End \_\_\_\_\_ within \_\_\_\_\_ (feet)  
Cross-Section #

Upstream End \_\_\_\_\_ within \_\_\_\_\_ (feet)  
Cross-Section #

#### 2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

- |   |   |   |   |
|---|---|---|---|
| <input type="checkbox"/> Stream Name                          | <input type="checkbox"/> Community Name     | <input type="checkbox"/> Corporate Limits labeled | <input type="checkbox"/> Study limits labeled   |
| <input type="checkbox"/> Confluences labeled                  | <input type="checkbox"/> Channel Stationing | <input type="checkbox"/> Streambed profiled       | <input type="checkbox"/> Cross Sections labeled |
| <input type="checkbox"/> Horizontal/Vertical Scales indicated |   | <input type="checkbox"/> 100-year elevs profiled* |   |
| <input type="checkbox"/> Road Crossings                       | <input type="checkbox"/> Labeled            | <input type="checkbox"/> Low Chord Elevations     | <input type="checkbox"/> Top of Road Elevations |

\*All recurrence intervals in the effective study must also be profiled.

#### Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ Yes ☐ Not Required

FEDERAL EMERGENCY MANAGEMENT AGENCY  
RIVERINE/COASTAL MAPPING

O.M.B No. 3067-0148  
Expires April 30, 2001

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

*Note: Fill out one form for each flooding source studied*

Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

This is a ☐ Manual ☐ Digital submission. *Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance as possible.*

**1. MAPPING CHANGES**

1. A topographic workmap must be submitted showing the following information (check N/A when not applicable):

- |   |                              |                             |                              |
|---|------------------------------|-----------------------------|------------------------------|
| a. Revised approximate 100-year floodplain boundaries (Zone A)  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| b. Revised detailed 100- and 500-year floodplain boundaries.  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| c. Revised floodway boundaries  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| d. Location and alignment of all cross sections with stationing control indicated.  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| e. Stream alignments, road alignments and dam alignments.   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| f. Current community boundaries.  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| g. Effective 100-year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| i. The requester's property boundaries and community easements  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| j. The signed certification of a registered professional engineer   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| k. Location and description of reference marks  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| l. Vertical datum (example: NGVD, NAVD)   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| m. Coastal zone designations tie into adjacent areas not being revised  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| n. Location and alignment of all coastal transects used to revise the coastal analyze   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| o. V-zone has been delineated to extend landward to the heel of the primary frontal dune  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |

**If any items are marked No or N/A please attach an explanation.**

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)?

3. What is the scale and contour interval of the following workmaps?

Effective FIS                      Scale \_\_\_\_\_                      Contour Interval \_\_\_\_\_

Revision Request                      Scale \_\_\_\_\_                      Contour Interval \_\_\_\_\_

*NOTE: Revised topographic information must be of equal or greater detail than effective.*

4. Attach an annotated FIRM/FBFM at the scale of the effective FIRM/FBFM showing the revised 100- and 500-year floodplain and the floodway boundaries and how they tie into those shown on the effective FIRM/FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies. **FIRM/FBFM attached?** ☐ Yes ☐ No

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

## 2. EARTH FILL PLACEMENT

1. The fill is: ☐ Existing ☐ Proposed

2. Has fill been/will be placed in the regulatory floodway? ☐ Yes ☐ No  
If Yes, please attach completed Riverine Hydraulic Analysis Form (Form 4).

3. Has fill been/will be placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ No

If Yes, then complete A, B, C, and D below.

a. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? ☐ Yes ☐ No

If Yes, justify steeper slopes \_\_\_\_\_

b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (*Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.*)

☐ Yes ☐ No

If No, describe erosion protection provided \_\_\_\_\_

c. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? ☐ Yes ☐ No

d. Can structures conceivably be constructed on the fill at any time in the future? ☐ Yes ☐ No

**If Yes, attach certification of fill compaction (item 3c. above) by the community's NFIP permit official, a registered professional Engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.**

**Fill certification attached** ☐ Yes ☐ No

4. Has fill been/will be placed in a V zone? ☐ Yes ☐ No

If Yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall?

☐ Yes ☐ No

If Yes, attach the Coastal Structures Form (Form 10).

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Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. REACH TO BE REVISED**

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.

Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☐ Yes

Downstream Limit: \_\_\_\_\_

Upstream Limit: \_\_\_\_\_

**2. CHANNEL DESCRIPTION**

**Attach the following information about the channel (check box if information has been provided):**

- ☐ Description of the inlet and outlet
- ☐ Description of the shape of the channel (*both cross sectional and planimetric configuration*) and its lining (*channel bottom and sides*):

**3. ACCESSORY STRUCTURES**

The channelization includes:

- ☐ Levees (*Attach Levee/Floodwall System Analysis Form - Form 8*)
- ☐ Drop structures
- ☐ Superelevated sections
- ☐ Transitions in cross sectional geometry
- ☐ Debris basin/detention basin
- ☐ Energy dissipater
- ☐ Other (Describe):

**4. DRAWING CHECKLIST**

**Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):**

- ☐ Channel alignment and locations of inlet, outlet, and accessory structures
- ☐ Channel lining
- ☐ Typical cross sections and profiles of channel banks and invert

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

## 5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry \_\_\_\_\_ (cfs) and/or the \_\_\_\_\_-year flood.
2. The design elevation in the channel based on:
- ☐ Subcritical flow
  - ☐ Critical flow
  - ☐ Supercritical flow
  - ☐ Energy grade line
3. If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.
- |                     |                              |                             |
|---------------------|------------------------------|-----------------------------|
| Inlet to channel?   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Outlet of channel?  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| At Drop Structures? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| At Transitions?     | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Other locations?    | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
- Explanation Attached? ☐ Yes ☐ No ☐ N/A

## 6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information **(Check the box if provided)**:

- ☐ Estimated sediment load
- ☐ Method used to estimate sediment transport
- ☐ Method used to estimate scour and/or deposition
- ☐ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

**PUBLIC BURDEN DISCLOSURE NOTICE**

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Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. IDENTIFIER**

1. Name of structure (roadway, railroad, etc.): \_\_\_\_\_

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):  
\_\_\_\_\_

3. This revision reflects (check one of the following):

- ☐ New bridge/culvert not modeled in the FIS  
☐ Modified bridge/culvert previously modeled in the FIS  
☐ New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)  
\_\_\_\_\_

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (*Attach justification*)

Justification attached ☐ Yes ☐ No ☐ N/A

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

## 2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

- ☐ Dimensions (height, width, span, radius, length)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Low Chord Elevations - Upstream and Downstream
- ☐ Top of Road Elevations - Upstream and Downstream
- ☐ Structure Invert Elevations - Upstream and Downstream
- ☐ Stream Invert Elevations - Upstream and Downstream
- ☐ Skew Angle
- ☐ Cross-Section Locations
- ☐ Distances Between Cross Sections
- ☐ Erosion Protection

## 3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (**Check the box if provided**):

- ☐ Estimated sediment load
- ☐ Method used to estimate sediment transport
- ☐ Method used to estimate scour and/or deposition
- ☐ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

**FEDERAL EMERGENCY MANAGEMENT AGENCY  
LEVEE/FLOODWALL SYSTEM ANALYSES**

O.M.B. Burden No. 3067-0148  
Expires April 30, 2001

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 3.0 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. REACH TO BE REVISED**

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.  
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☐ Yes

Downstream Limit: \_\_\_\_\_

Upstream Limit: \_\_\_\_\_

**2. LEVEE/FLOODWALL SYSTEM ELEMENTS**

1. This Levee/Floodwall analysis is based on:

- ☐ upgrading of an existing levee/floodwall system
- ☐ a newly constructed levee/floodwall system
- ☐ reanalysis of an existing levee/floodwall system

2. Levee elements and locations are:

- ☐ earthen embankment, dike, berm, etc. Station \_\_\_\_\_ to \_\_\_\_\_
- ☐ structural floodwall Station \_\_\_\_\_ to \_\_\_\_\_
- ☐ other (describe): \_\_\_\_\_ Station \_\_\_\_\_ to \_\_\_\_\_

3. Structural Type:

- ☐ monolithic cast-in place reinforced concrete
- ☐ reinforced concrete masonry block
- ☐ sheet piling
- ☐ other (describe): \_\_\_\_\_

4. Has this levee/floodwall system been certified by a Federal agency to provide protection against the 1% annual chance (100-year) Flood event? ☐ Yes ☐ No

If Yes, by which agency? \_\_\_\_\_

If Yes, complete only the interior drainage section on pages 7 and 8 of this form and the operation and Maintenance section of Revision Requestor and Community Official Form.

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

## 2. LEVEE/FLOODWALL SYSTEM ELEMENTS (Cont'd)

5. Attach certified drawings containing the following information (indicate drawing sheet numbers):

- |   |                     |
|---|---------------------|
| a. Plan of the levee embankment and floodwall structures.   | Sheet Numbers _____ |
| b. A profile of the levee/floodwall system showing the 100-year water-surface (base flood) elevation, levee and/or wall crest and foundation, and closure locations for the total levee system. | Sheet Numbers _____ |
| c. A profile of the base flood elevation, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure device.   | Sheet Numbers _____ |
| d. A layout detail for the embankment protection measures.  | Sheet Numbers _____ |
| e. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations.                                     | Sheet Numbers _____ |

## 3. FREEBOARD

1. The minimum freeboard provided above the base flood elevation is:

### Riverine

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| 3.0 feet or more at the downstream end and throughout             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3.5 feet or more at the upstream end                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4.0 feet immediately upstream of all structures and constrictions | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

### Coastal

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| 1.0 foot above the height of the one percent wave for the 100-year stillwater surge elevation or maximum wave runup (whichever is greater). | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2.0 feet above 100-year stillwater surge elevation  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation Addressing Part 65.10(b)(1)(ii) of the National Flood Insurance Program regulations.

If No is answered to any of the above, please attach an explanation.

2. Is there an indication from historical records that ice-jamming can effect the base flood elevation? ☐ Yes ☐ No  
**If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.**

3. Tabulate the elevations at critical locations (tabulate values at each levee crest grade change, and where sediment may accumulate such as along bends in the channel.)

Station	Location	100-year Water Surface Elevation	Levee Crest	Freeboard (ft.)
	Upper end			
	Lower end			

(Extend table on an added sheet as needed and reference)

#### 4. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year water-surface (base flood) elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information:

- ☐ Estimated sediment load
- ☐ Method used to estimate sediment transport
- ☐ Method used to estimate scour and/or deposition
- ☐ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

#### 5. CLOSURES

1. Openings through the levee system:

- ☐ exist                      ☐ do not exist

If openings exist, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note:

Geotechnical and geologic data

In addition to the required detail analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following levee system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers EM-1110-2-1906 Form 2086).

1. The maximum levee slope landside is: _____									
2. The maximum levee slope floodside is: _____									
3. The range of 100-year (base) riverine flood velocities along the levee? _____ (min.) to _____ (max.)									
4. Embankment material is protected by (describe the kind): _____ _____ _____									
5. Riprap Design Parameters: (Include references) <input type="checkbox"/> Velocity <input type="checkbox"/> Tractive stress									

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D <sub>100</sub>	D <sub>50</sub>	Thickness	
Sta     to								
Sta     to								
Sta     to								
Sta     to								
Sta     to								
Sta     to								

(Extend table on an added sheet as needed and reference)

6. Is a bedding/filter analysis and design attached?		<input type="checkbox"/> Yes <input type="checkbox"/> No
7. Describe the analysis used for other kinds of protection used (include copies of the design analysis):     		

**Note:** Attach engineering analysis to support construction plans.

## 7. EMBANKMENT AND FOUNDATION STABILITY

1. Identify locations and describe the basis for selection of critical location for analysis: \_\_\_\_\_

☐ Overall height: Sta \_\_\_\_\_, height \_\_\_\_\_ ft.

☐ Limiting foundation soil strength:

Sta \_\_\_\_\_, depth \_\_\_\_\_ to \_\_\_\_\_

Strength  $\phi$  = \_\_\_\_\_ degrees,  $c$  = \_\_\_\_\_ psf

slope: SS = \_\_\_\_\_ (h) to \_\_\_\_\_ (v)

(Repeat as needed on an added sheet for additional locations)

2. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

3. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: U.S. Army Corps of Engineers (USACE) EM-1110-2-1913 Table 6-1)

4. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

If Yes, describe methodology used: \_\_\_\_\_

5. Was a seepage analysis for the foundation performed: ☐ Yes ☐ No

6. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

7. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

8. The duration of 100-year (base) flood hydrograph against the embankment is \_\_\_\_\_ hours.

**Note:** Attach engineering analysis to support construction plans.

## 8. FLOODWALL AND FOUNDATION STABILITY

1. Describe analysis submittal based on Code:

☐ UBC (1988)                      or                      ☐ Other (specify):

2. Stability analysis submitted provides for:

☐ Overturning                      ☐ Sliding; If not, explain: \_\_\_\_\_  
 \_\_\_\_\_

3. Loading included in the analyses were:

☐ Lateral earth @  $P_A =$  \_\_\_\_\_ psf;  $P_p =$  \_\_\_\_\_ psf  
☐ Surcharge-Slope @ \_\_\_\_\_, ☐ surface \_\_\_\_\_ psf  
☐ Wind @  $P_w =$  \_\_\_\_\_ psf  
☐ Seepage (Uplift); \_\_\_\_\_ ☐ Earthquake @  $P_{eq} =$  \_\_\_\_\_ %g  
☐ 100-year significant wave height \_\_\_\_\_ ft.  
☐ 100-year significant wave period \_\_\_\_\_ sec.

4. Summary of Stability Analysis Results: Factors of Safety. Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)

(Note: Extend table on an added sheet as needed and reference)

5. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

6. Foundation scour protection ☐ is, ☐ is not provided. Describe if provided:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Note:** Attach engineering analysis to support construction plans.

## 9. SETTLEMENT

1. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☐ Yes ☐ No
2. The computed range of settlement is \_\_\_\_\_ ft. to \_\_\_\_\_ ft.
3. Settlement of the levee crest is determined to be primarily from:
  - ☐ Foundation consolidation
  - ☐ Embankment compression
  - ☐ Other (describe):
4. Differential settlement of floodwalls
  - ☐ has ☐ has not been accommodated in the structural design and construction.

**Note: Attach engineering analysis to support construction plans.**

## 10. INTERIOR DRAINAGE

1. Specify size of each interior watershed

Draining to pressure conduit: \_\_\_\_\_

Draining to ponding area: \_\_\_\_\_

2. Relationships Established

Ponding elevation vs. storage	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Ponding elevation vs. gravity flow	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Differential head vs. gravity flow	<input type="checkbox"/> Yes	<input type="checkbox"/> No

3. The river flow duration curve is enclosed ☐ Yes ☐ No

4. Specify the discharge capacity of the head pressure conduit: \_\_\_\_\_

5. Which Flooding Conditions Were Analyzed?

- |                                     |                              |                             |
|-------------------------------------|------------------------------|-----------------------------|
| • Gravity flow (Interior Watershed) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| • Common storm (River Watershed)    | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| • Historical ponding probability    | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| • Coastal wave overtopping          | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

**If No, explain why not:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No

**If No, explain why not:** \_\_\_\_\_

\_\_\_\_\_

7. The rate of seepage through the levee system for the 100-year (base) flood is \_\_\_\_\_ cfs

### 10. INTERIOR DRAINAGE (Cont'd)

8. The length of levee system used to drive this seepage rate in item 7: \_\_\_\_\_ ft.

9. Will a pumping plant(s) be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants: \_\_\_\_\_

For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operations be automatic?

☐ Yes ☐ No

If the pumps are electric, are there backup power sources?

☐ Yes ☐ No

(Reference: U.S. Army Corps of Engineers EM-1110-2-3101, 3102, 3103, 3104, and 3105)

**Note:** Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

### 11. OTHER DESIGN CRITERIA

1. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem

Hydrocompaction ☐ is ☐ is not a problem

Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

2. For each of these problems, state the basic facts and corrective action taken:

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3. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure? ☐ Yes ☐ No

**Note:** Attach supporting documentation

## 12. OPERATIONAL PLAN AND CRITERIA

1. Are the planned/installed works in full compliance with NFIP regulations, Section 44 CFR Ch. 1 1.65.10

☐ Yes ☐ No

2. Does the operation plan incorporate all the provisions for closure devices as required in Section 65.10(c)(1), of the NFIP regulations?

☐ Yes ☐ No

3. Does the operation plan incorporate all the provisions for interior drainage as required in Section 65.10(c)(2), of the NFIP regulations?

☐ Yes ☐ No

If the answer is No to any of the above, please explain below.

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Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. COASTLINE TO BE REVISED**

Describe limits of study area:

\_\_\_\_\_  
\_\_\_\_\_

**2. EFFECTIVE FIS**

The area being revised was studied in the FIS using (Check all that apply):

- ☐ Approximate methods  
☐ Only the stillwater surge elevation designated  
☐ Detailed methods with:  
  
☐ Wave setup computations  
☐ Wave runup computations  
☐ Wave height computations  
☐ Dune erosion computations  
☐ Storm surge modeling. Specify model used:

- ☐ SPLASH  
☐ TTSURGE  
☐ FEMA STORM SURGE

- ☐ SLOSH  
☐ WIFM  
☐ OTHER: \_\_\_\_\_

**3. REVISED ANALYSIS**

Number of transects in revised analysis \_\_\_\_\_

Check all analyses used to prepare the revision:

- ☐ Wave setup analyses (complete Items 1, 2, and 3)  
☐ Stillwater elevation determinations (complete Item 1)  
☐ Erosion considerations (complete Item 2)  
☐ Wave height analysis (complete Items 2 and 3)  
☐ Wave runup analysis (complete Items 2 and 3)  
☐ Wave overtopping assessment (complete Items 2 and 3)  
☐ Reflect more detailed topographic information (Form 2)  
☐ Reflect shore protection structures (attach completed Coastal Structures Form - Form 10)  
☐ Other

If other, give basis of revision request with an explanation:

\_\_\_\_\_

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

### 3. REVISED ANALYSIS (CONTINUED)

#### 1. Stillwater Elevation Determinations

a. How were stillwater elevations determined?

- ☐ Gage analysis  
☐ Storm surge analysis  
☐ Other - explain below:

---



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If revised gage analysis, list gages utilized:

Gage Number	Number of Years of Record	Gage Site Location

Provide copies of gage data and revised analysis.

b. Specify what datum was used in the calculations: \_\_\_\_\_

**If not the FIS datum, have the calculations been adjusted to the FIS datum:**

☐ Yes   ☐ No   ☐ Specify Conversion factor: \_\_\_\_\_

c. If revised storm surge analysis, was FEMA's storm surge model utilized:

☐ Yes   ☐ No

**If Yes, amount of wave setup added to stillwater elevation \_\_\_\_\_ ft**

**d. If wave setup was computed, attach a description of methodology used.**      Description attached ☐ Yes   ☐ No

**e. If FEMA's storm surge model used, attach a detailed description of the differences between current analysis and revised analysis, and why revised analysis should replace current analysis:**

Description attached ☐ Yes   ☐ No

#### 2. Revised analysis (*i.e., erosion, wave height, wave runup, and wave overtopping*)

**If FEMA procedures were utilized to perform the revision, attach a detailed description of differences between the current and the revised analysis, and why the revised analysis should replace the current analysis:**

Description attached ☐ Yes   ☐ No

**If FEMA procedures were not utilized to perform the revision, provide full documentation on methodology And/or models used, including operational program, detailed differences between methodology and/or Model utilized and FEMA's methodology and/or model. Also, attach an explanation why new methodology and/or model Should replace current methodology and/or model.**

Explanation attached ☐ Yes   ☐ No

### 3. REVISED ANALYSES (CONTINUED)

#### 3. Wave height and wave runup analyses

Wave runup and overtopping analyses are typically considered when wave heights and/or wave runup are close to or greater than the crest of shore protection structures or natural land forms.

- a. Was an overtopping analysis performed for any coastal shore protection structures or natural land forms that may be overtopped? ☐ Yes ☐ No

If Yes, attach an explanation of the methodology utilized and describe in detail the results of the analysis:

Explanation attached ☐ Yes ☐ No

- b. What is the estimated amount of overtopping \_\_\_\_\_ cfs/ft.

If No, attach an explanation why these analyses were not performed.

Explanation attached ☐ Yes ☐ No

- c. Was wave setup included in wave height analysis and removed for erosion and wave runup analyses? ☐ Yes ☐ No

### 4. RESULTS

1. Stillwater storm surge elevation \_\_\_\_\_
2. Wave setup \_\_\_\_\_
3. Minimum ground elevation within project area \_\_\_\_\_ feet NGVD
4. Maximum wave height elevation \_\_\_\_\_
5. Maximum wave runup elevation \_\_\_\_\_
6. As a result of the revised analyses, the V Zone location has shifted a maximum of \_\_\_\_\_ feet seaward and \_\_\_\_\_ feet landward of its existing position.
7. Have areas designated as coastal high hazard areas (V-zones) increased or decreased?  
☐ Increased ☐ Decreased ☐ Both  
Attach a description where they have increased and/or decreased.  
Description attached ☐ Yes ☐ No
8. The 100-year (base) flood elevations have: ☐ increased ☐ decreased
9. What was the greatest increase? \_\_\_\_\_ Feet
10. What was the greatest decrease? \_\_\_\_\_ Feet
11. The base flood boundary has: ☐ increased ☐ decreased

Attach a description where it has increased or decreased.

Description attached ☐ Yes ☐ No

Please provide a map with revised shoreline due to either erosion or accretion, if appropriate.

Map Attached? ☐ Yes ☐ No ☐ N/A

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Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. BACKGROUND**

1. Name of structure (if applicable): \_\_\_\_\_

2. Structure location: \_\_\_\_\_  
\_\_\_\_\_

3. Type of structure:

- |                                       |   |
|---------------------------------------|---|
| <input type="checkbox"/> Levee/dike*  | <input type="checkbox"/> Bulkhead                                 |
| <input type="checkbox"/> Revetment    | <input type="checkbox"/> Seawall                                  |
| <input type="checkbox"/> Breakwater   | <input type="checkbox"/> Soft Shore Protection (i.e., sand dunes) |
| <input type="checkbox"/> Other: _____ |   |

**\*Note:** If the coastal structure is a levee/floodwall, complete the Levee/Floodwall System Analyses Form (Form 8).  
The remainder of this form does not need to be completed.

4. Material structure is composed of:

- |                                   |                                       |
|-----------------------------------|---------------------------------------|
| <input type="checkbox"/> Stone    | <input type="checkbox"/> Earthen fill |
| <input type="checkbox"/> Concrete | <input type="checkbox"/> Steel        |
| <input type="checkbox"/> Sand     | <input type="checkbox"/> Other        |

5. The structure is: ☐ New ☐ Existing ☐ Proposed

If existing, describe in detail the modifications being made to the structure and the purpose of the modifications: \_\_\_\_\_

6. Copies of certified "as-built" plans ☐ are ☐ are not attached. If "as-built" plans are not available for submittal, please explain why and submit a sketch with general structure dimensions including: face slope, height, length, depth, and toe elevation referenced to the appropriate datum (example: NGVD 1929, NAVD 1988, etc.)

7. Has a Federal agency with responsibility for the design of coastal flood protection structures designed or certified that the structure(s) has/have been adequately designed and constructed to provide protection against the base 100-year (base) flood?

☐ Yes ☐ No

If Yes, specify the name of the agency and dates of project completion and/or certification. **No other sections of this form need to be completed.** \_\_\_\_\_

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS.**

## 2. DESIGN CRITERIA

### 1. Design Parameters

- a. Were physical parameters representing the base flood event or greater used to design the coastal flood protection structure?

☐ Yes ☐ No

- b. The number of design water levels that were evaluated \_\_\_\_\_ (number) range from mean low water \_\_\_\_\_ feet to the 100-year stillwater surge elevation of \_\_\_\_\_ feet. The critical water level is \_\_\_\_\_ feet. The datum that these elevations are referenced to is \_\_\_\_\_ (example: NGVD 1929, NAVD 1988, etc.)

- c. Wave heights and periods were computed for each water level analyzed. ☐ Yes ☐ No

**If No, attach an explanation specifying which water levels were analyzed:**

**Explanation attached** ☐ Yes ☐ No

- d. 100-year significant wave height is: \_\_\_\_\_

- e. 100-year significant wave period is: \_\_\_\_\_

- f. 100-year one-percent wave height is: \_\_\_\_\_

- g. Were breaking wave forces used to design the structure? ☐ Yes ☐ No

**If No, attach an explanation why they were not used for design:**

### 2. Settlement

- a. What is the settlement rate expected at the site of the structure?: \_\_\_\_\_

\_\_\_\_\_

- b. Please provide a settlement analysis. **Settlement Analysis Attached?** ☐ Yes ☐ No

## 2. DESIGN CRITERIA (continued)

### 3. Freeboard

a. Does the structure have 1 foot of freeboard above the height of the one-percent wave for the 100-year stillwater surge elevation or maximum wave runup (whichever is greater)? ☐ Yes ☐ No

b. Does the structure have freeboard of at least 2 feet above the 100-year stillwater surge elevation: ☐ Yes ☐ No

FEMA does not typically recognize structures as providing 100-year (base) flood protection if they do not meet the freeboard criteria listed above. Please note, occasionally exceptions are made to the minimum freeboard requirement. Please consult the National Flood Insurance Program Regulation 65.10, regarding freeboard requirements.

### 4. Toe Protection

Specify the type of toe protection: \_\_\_\_\_

**If no toe protection is provided, provide analysis of scour potential and attach an evaluation of structural stability performed with potential scour at the toe. Analysis and Evaluation Attached?** ☐ Yes ☐ No ☐ N/A

### 5. Backfill Protection

Will the structure be overtopped during the base flood event? ☐ Yes ☐ No

**If the structure will be overtopped, attach an explanation of what measures are used to prevent the loss of backfill from rundown over the structure, drainage landward, under or laterally around the ends of the structure, or through seams and drainage openings in the structure?**

**Explanation attached** ☐ Yes ☐ No ☐ N/A

## 2. DESIGN CRITERIA (continued)

### 6. Structural Stability - Minimum water level

- a. For coastal revetments, was a geotechnical analysis of potential failure in the landward direction by rotational gravity slip performed for maximum loads associated with minimum seaward water level, no wave action, saturated soil conditions behind the structure, and maximum toe scour? ☐ Yes ☐ No
- b. For gravity and pile-supported seawalls, were engineering analyses of seaward sliding, seaward overturning, and of foundation adequacy using maximum pressures developed in the sliding and overturning calculations performed? ☐ Yes ☐ No
- c. For anchored bulkheads, were engineering analyses performed for shear failure, moment failure, and adequacy of tiebacks and deadmen to resist loading under low-water conditions? ☐ Yes ☐ No

### 7. Structural Stability - Critical Water Level (**Note:** All structures must be designed to resist the maximum loads associated with the critical water level to be credited as providing 100-year protection.)

- a. For coastal revetments were geotechnical analyses performed investigating the potential failure in the seaward direction by rotational gravity slip or foundation failure due to inadequate bearing strength? ☐ Yes ☐ No
- b. For revetments, were engineering analyses of rock, riprap, or armor blocks' stability under wave action performed or uplift forces on the rock, riprap, or armor blocks? ☐ Yes ☐ No
- c. Are the rocks graded? ☐ Yes ☐ No
- d. Are soil or geotextile filters being used in the design? ☐ Yes ☐ No
- e. For gravity and pile supported seawalls, were engineering analyses of landward sliding, landward overturning, and foundation adequacy performed? ☐ Yes ☐ No
- f. For anchored bulkheads, were engineering analyses of shear and moment failure performed using "shock" pressures? ☐ Yes ☐ No

**For all analyses marked No above for the appropriate type of structure, please attach an explanation why the analyses were not performed.**

**Explanation attached**

☐ Yes ☐ No

## 2. DESIGN CRITERIA (continued)

### 8. Material Adequacy

The design life of the structure given the existing conditions at the structure site is \_\_\_\_ years.

### 9. Ice and Impact Alignment

a. Will the structure be subjected to ice forces?

☐ Yes ☐ No

If Yes, was it designed for such forces?

☐ Yes ☐ No

**If Yes, attach impact analysis.**

**Analysis attached**

☐ Yes ☐ No

b. Will the structure be subjected to impact forces from boats, ships, or large debris?

☐ Yes ☐ No

If Yes, was it designed for those impact forces?

☐ Yes ☐ No

**If Yes, attach impact analysis.**

**Analysis attached**

☐ Yes ☐ No

### 10. Structure Plan Alignment

The structure is (check one):

☐ isolated

☐ part of a continuous structure with redundant return walls at frequent intervals.

**Please provide a map showing the location of the structure and any natural land features which shelter the structure from wave actions. Map Attached? ☐ Yes ☐ No**

### 11. Certification

As a professional engineer, I certify that the above structure will withstand all hydraulic and wave forces associated with the 1% annual Chance flood without significant structural degradation.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Seal

### 3. ADVERSE IMPACT EVALUATION

1. The structure is:

- ☐ existing
- ☐ new
- ☐ an enlargement of an existing structure
- ☐ a replacement structure of the same size and design as what was previously at the site

2. If the structure is new or enlarged, will the structure impact flooding and erosion for areas adjacent to the structure? ☐ No ☐ Yes

If Yes, attach an explanation

Explanation attached ☐ Yes ☐ No

### 4. COMMUNITY AND/OR STATE REVIEW

1. Has the design, maintenance, and impact of the structure been reviewed and approved by the community, and any Federal, State, or local agencies having jurisdiction over flood control and coastal construction activities in the area the structure impacts: ☐ Yes ☐ No

If Yes, attach a list of agencies who have reviewed and approved the project.

Explanation attached ☐ Yes ☐ No

If No, attach an explanation why review and approval by the appropriate community or agency has not been obtained.

Explanation attached ☐ Yes ☐ No

2. Enclose all design analyses that apply. Design Analyses Attached? ☐ Yes ☐ No ☐ N/A

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Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. IDENTIFIER**

1. Name of Dam: \_\_\_\_\_

2. Location of dam along flood source (in terms of stream distance or cross section identifier):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. This request is for (check one of the following):

☐ Existing dam

☐ New dam

☐ Modifications of existing dam (describe modifications): \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

4. Was the dam designed by: ☐ Federal agency ☐ State agency ☐ Local government agency ☐ Private organization?

**2. BACKGROUND**

1. Does the dam have dedicated flood control storage? ☐ Yes ☐ No

2. Does the project involve revised hydrology? ☐ Yes ☐ No

**If Yes, complete Hydrologic Analysis Form (Form 3) and include calculations of the 100-year inflow flood hydrograph routed through the dam with the beginning pool at the normal pool elevation (spillway crest elevation for ungated spillway). Include any inflow hydrograph bulking by watershed sediment yield and provide necessary debris and sediment yield analysis.**

3. Does the revised hydrology affect the 100-year water-surface (base flood) elevation behind the dam or downstream of the dam?

☐ Yes ☐ No

**If yes, complete the Riverine Hydraulic Analysis Form (Form 4) and complete the table shown on the following page.**

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

### 3. RESULTS

	Stillwater Elevation Behind the Dam	
	FIS	REVISED
10-year		
50-year		
100-year		
500-year		
Normal Pool Elevation		

1. Was long-term sediment accumulation taken into consideration in determining the normal pool elevation? ☐ Yes ☐ No

2. Was the dam designed to withstand the hydrostatic and hydrodynamic forces associated with floods greater than the base flood? ☐ Yes ☐ No

**If No, the dam should not be modeled as considering the attenuation effects from the dam.**

3. Provide the following data on the dam:

Dimensional Height: \_\_\_\_\_

Crest Elevation of top of dam: \_\_\_\_\_

Base flood storage capacity: \_\_\_\_\_

Freeboard (measured from base flood elevation): \_\_\_\_\_

4. Spillway(s):

Type: ☐ gated ☐ ungated

Dimensional Width: \_\_\_\_\_

Dimensional Height: \_\_\_\_\_

Crest Elevation of Top of Spillway: \_\_\_\_\_

5. Outlet(s):

Type: ☐ gated ☐ ungated

Width: \_\_\_\_\_

Height: \_\_\_\_\_

Diameter: \_\_\_\_\_

Invert Elevation: \_\_\_\_\_

6. Explain flow regulation plan: \_\_\_\_\_

\_\_\_\_\_

7. Are the project features, including the emergency spillway, designed to accommodate the 100-year flood discharge without overtopping the dam? ☐ Yes ☐ No

8. Was the dam designed in accordance with all currently applicable local, State, and Federal regulations? ☐ Yes ☐ No

**If No, please attach an explanation. Explanation attached ☐ Yes ☐ No**

FEMA may request a list of regulations that have been complied with and supporting documentation Demonstrating compliance with these regulations.

9. Attach copy of formal operation and maintenance plan. Plan Attached? ☐ Yes ☐ No

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Community Name: \_\_\_\_\_

Flooding Source: \_\_\_\_\_

Project Name/Identifier: \_\_\_\_\_

**1. AREA TO BE REVISED**

Downstream limit: \_\_\_\_\_

Upstream limit: \_\_\_\_\_

Describe flood zone designation as shown on the effective FIRM for area to be revised (*i.e.*, *Zone AO with depth and velocity*, *Zone AO with depth*, or *Zone A*):

\_\_\_\_\_

**2. TOPOGRAPHIC MAP**

Attach a topographic map(s) which show the following items:

- ☐ The revised flood boundaries with revised depths and velocities (if applicable) that tie into the effective boundaries
- ☐ The correct alignment and location of all structural features

**3. STRUCTURAL FLOOD CONTROL MEASURES**

1. The following structures are proposed or built: **(Check all that apply)**

- ☐ Channelization **(Attach completed form - Form 6)**
- ☐ Levee/Floodwall **(Attach completed form - Form 8)**
- ☐ Dam **(Attach completed form - Form 11)**
- ☐ Sedimentation Basin
- ☐ Other (*describe*): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Have the impacts and the design and maintenance requirements of the structural measures been reviewed and approved by all impacted communities and by state and local agencies that have jurisdiction over flood control activities? ☐ Yes ☐ No

3. Attach copies of letters stating communities' and agencies' approval. Letters Attached? ☐ Yes ☐ No ☐ N/A

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

#### 4. HYDROLOGIC AND SEDIMENT ANALYSES

1. 100-year (base flood) discharge at the apex: Peak Flow \_\_\_\_\_ cfs

2. Is the base flood apex discharge that is listed above, the discharge presented in the effective FIS? ☐ Yes ☐ No

**If No, submit the following:**

a. Attach a plot of the flood frequency curve on log-normal probability paper and include the name of the flooding source and the drainage area above the apex, and the mean, standard deviation, and skew coefficient of the curve.

b. Attach the Hydrologic Analysis Form.

3. Sediment load associated with the  
base flood apex discharge: Peak Flow \_\_\_\_\_ cfs

Volume \_\_\_\_\_ acre-feet

**Attach an explanation of the method used to estimate sediment load and attach all calculations.**

**Explanation attached** ☐ Yes ☐ No

4. Debris load associated with the  
base flood apex discharge: Peak Flow \_\_\_\_\_ cfs

Volume \_\_\_\_\_ acre-feet

**Attach an explanation of the method used to estimate debris load and attach all calculations.**

**Explanation attached** ☐ Yes ☐ No

#### 4. HYDROLOGIC AND SEDIMENT ANALYSES (Cont'd)

5. List the bulking factor, if any, used for this project: \_\_\_\_\_

6. Complete the following for potential adverse conditions (such as deforestation of the watershed by fire):

base flood discharge at the apex

Peak Flow \_\_\_\_\_ cfs

Volume \_\_\_\_\_ acre-feet

Sediment load associated with the  
base flood discharge

Peak Flow \_\_\_\_\_ cfs

Volume \_\_\_\_\_ acre-feet

Debris load associated with the  
base flood discharge

Peak Flow \_\_\_\_\_ cfs

Volume \_\_\_\_\_ acre-feet

Attach all supporting calculations. Supporting Calculations Attached? ☐ Yes ☐ No ☐ N/A

7. Attach engineering analyses which demonstrate that flooding (including local runoff) from sources other than the apex is insignificant or has been accounted for in the design.

Analyses Attached? ☐ Yes ☐ No ☐ N/A

#### 5. STRUCTURAL ANALYSES

For channelization and/or levee/floodwall projects, answer the following:

1. Do the constructed or proposed structural measures provide protection from hazards associated with the possible relocation of flow paths from other parts of the fans? ☐ Yes ☐ No
2. Do the constructed or proposed structural measures affect flood hazards (including depth, velocity, scour, and sediment deposition) on other areas of the fans? ☐ Yes ☐ No

Attach an explanation of the methodology used to assess the impact.

Explanation attached ☐ Yes ☐ No

**Note:** Attach detailed engineering analyses to support answers if not included as part of completion of other forms.